

WHAT IS CLAIMED IS:

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1. An automated slide loader cassette for a microscope comprising

14 a slide cassette indexer for containing a plurality of microscope slides;

16 24 a slide exchange arm for gripping a microscope slide within said indexer and for transporting said slide to said microscope for observation and for transporting said slide after observation to return said slide back into said indexer, and

18 16 an XY-stage for moving said slide exchange arm between said indexer and said microscope.

16 said indexer, said arm, and said XY-stage are connected together and integrated into one unitary modular instrument that can be moved from one microscope to another.

2. The automated slide loader cassette according to claim 1, comprising

means for moving said slide cassette indexer along a

single vertical Z-axis along which is moved a slide cassette to a proper height for transfer of each slide; and

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said slide cassette indexer being mounted to a common, stable base-plate.

3. The automated slide loader cassette according to claim 2, wherein said base-plate also supports the microscope so that the orientation of the slide cassette indexer and the microscope remains fixed; and

said means for moving said slide cassette indexer comprises a motor and a motor driven leadscrew with mechanical limits at either end of travel of said slide cassette indexer.

4. The automated slide loader cassette according to claim 1, further comprising

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means for temporarily mounting the XY-stage to the microscope so that there is no interference with any optical operation of the microscope; and

means for moving said XY-stage in an X-axis direction and means for moving the XY-stage in a Y-axis direction.

5. The automated slide loader cassette according to claim 1, wherein the XY-stage has an integrated, spring loaded slide retention device that locates a slide at a fixed position; and

said retention device being actively disengageable by mechanical linkage when the XY-stage moves along X-axis direction to a slide exchange position.

6. The automated slide loader cassette according to claim 1, comprising

means for mounting the slide exchange arm to the XY-stage; and

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said slide exchange arm has a distal finger that manipulates the slide to remove said slide from the cassette *index* and to transfer the slide into a proper position on the XY-stage and subsequently to return the slide back into the cassette *index*

7. The automated slide loader cassette according to claim 6,

wherein said slide exchange arm has means for moving said arm along a long travel axis that is parallel to the X-axis of the XY-stage; and said long travel axis is defined as the radius R-axis; and *R-45*

 said slide exchange arm has means for moving said arm along a short lift travel axis that tilts said arm to completely disengage the slide; and this lift travel tilt axis is the T-axis.

8. The automated slide loader cassette according to claim 7, wherein said T-axis has two defined positions which are engaged and disengaged;

 said slide exchange arm being driven in the R-axis direction by a motor and a motor driven belt with end-limits; and

 said T-axis movement of the slide exchange arm is actuated by mechanical linkage to coordinated motion from the XY-stage X-axis.

9. An automated slide loader cassette in combination with a

microscope comprising

a microscope for individually viewing a plurality of slides one at a time;

a slide cassette indexer for containing a plurality of microscope slides;

a slide exchange arm for gripping a microscope slide within said indexer and for transporting said slide to said microscope for observation and for transporting said slide after observation to return said slide back into said indexer;

an XY-stage for moving said slide exchange arm between said indexer and said microscope; and

a computer controller for controlling the XY-stage;

said indexer, said arm and said XY-stage are connected together and integrated into one unitary modular instrument that can be moved from one microscope to another.

10. The automated slide loader cassette combination according to claim 9, comprising

means for moving said slide cassette indexer along a single vertical Z-axis along which is moved a slide cassette to

a proper height for transfer of each slide; and
said slide cassette indexer being mounted to a common,
stable base-plate.

11. The automated slide loader cassette combination according
to claim 10,

wherein said base-plate also supports the microscope so
that the orientation of the slide cassette indexer and the
microscope remains fixed; and

said means for moving said slide cassette indexer
comprises a motor and a motor driven leadscrew with mechanical
limits at either end of travel of said slide cassette indexer.

12. The automated slide loader cassette combination according
to claim 9, further comprising

means for temporarily mounting of the XY-stage to the
microscope so that there is no interference with any optical
operation of the microscope; and

means for moving said XY stage in an X-axis direction and
a means for moving the XY-stage in a Y-axis direction.

13. The automated slide loader cassette combination according to claim 9,

wherein the XY-stage has an integrated, spring loaded slide retention device that locates a slide at a fixed position; and

said retention device being actively disengageable by mechanical linkage when the XY-stage moves along an X-axis direction to a slide exchange position.

14. The automated slide loader cassette combination according to claim 9, comprising

means for mounting the slide exchange arm to the XY-stage; and

said slide exchange arm has a distal finger that manipulates the slide to remove said slide from the cassette and to transfer the slide into a proper position on the XY-stage and subsequently to return the slide back into the cassette.

15. The automated slide loader cassette combination according to claim 14,

wherein said slide exchange arm has means for moving said arm along a long travel axis that is parallel to the X-axis of the XY-stage; and said long travel axis is defined as the radius R-axis; and

said slide exchange arm has means for moving said arm along a short lift travel axis that tilts said arm to completely disengage the slide; and this lift travel tilt axis is the T-axis.

16. The automated slide loader cassette combination according to claim 15,

wherein said T-axis has two defined positions which are engaged and disengaged;

said slide exchange arm being driven in the R-axis direction by a motor and a motor driven belt with end-limits; and

said T-axis movement of the slide exchange arm is actuated by mechanical linkage to coordinated motion from the XY-stage X-axis.